

64-Bit Platform Solutions



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Agenda

-  Why 64-Bits?
-  64-Bit Market Overview – Brookwood
-  Panelist Views
 -  AMD -- Wayne Meretsky
 -  HP -- Jerry Huck
 -  NEC -- Len Tsai
 -  Sun -- Dave Tuttle
-  Q & A & Discussion -- Audience



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Why 64 Bits?

✍ $2^{32} = 4,294,967,296$

✍ $2^{64} = 18,446,744,073,709,551,616$

✍ Any Questions?



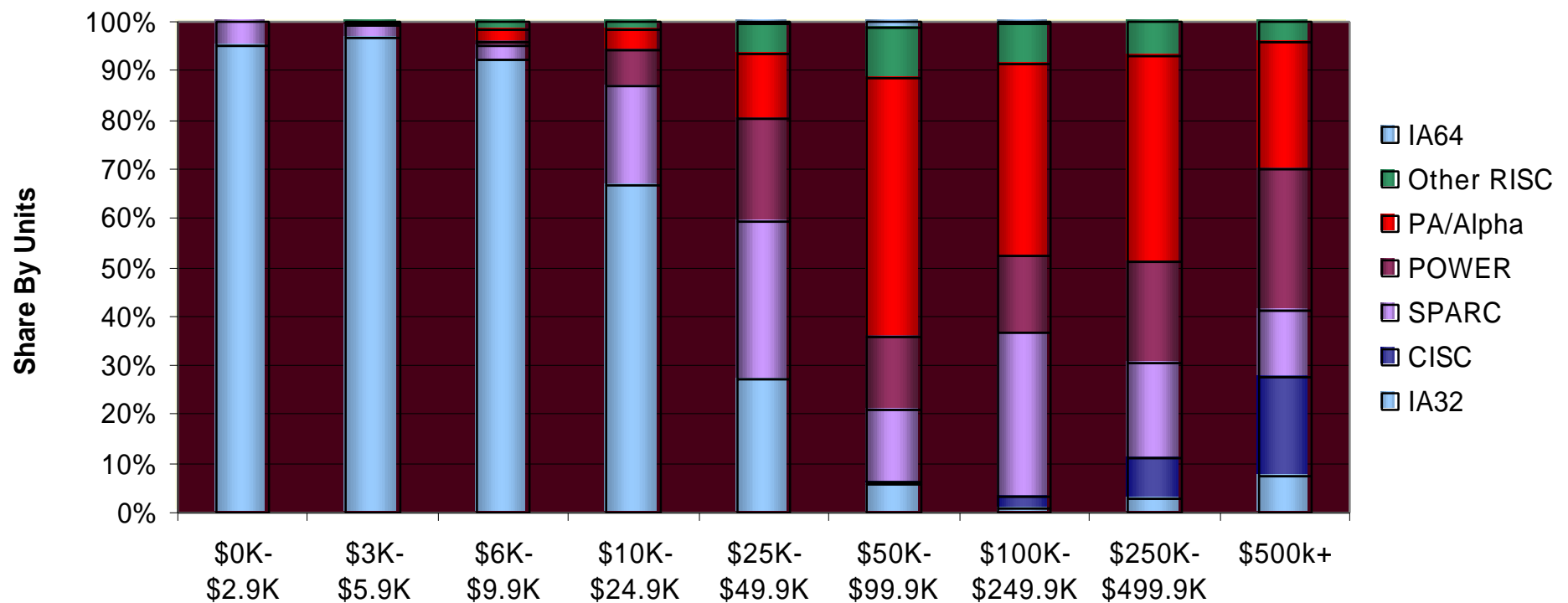
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x86 Dominates Low-End Shipments; 64-Bit Systems Dominate High-End



Source: IDC 1Q'02 Server Tracker

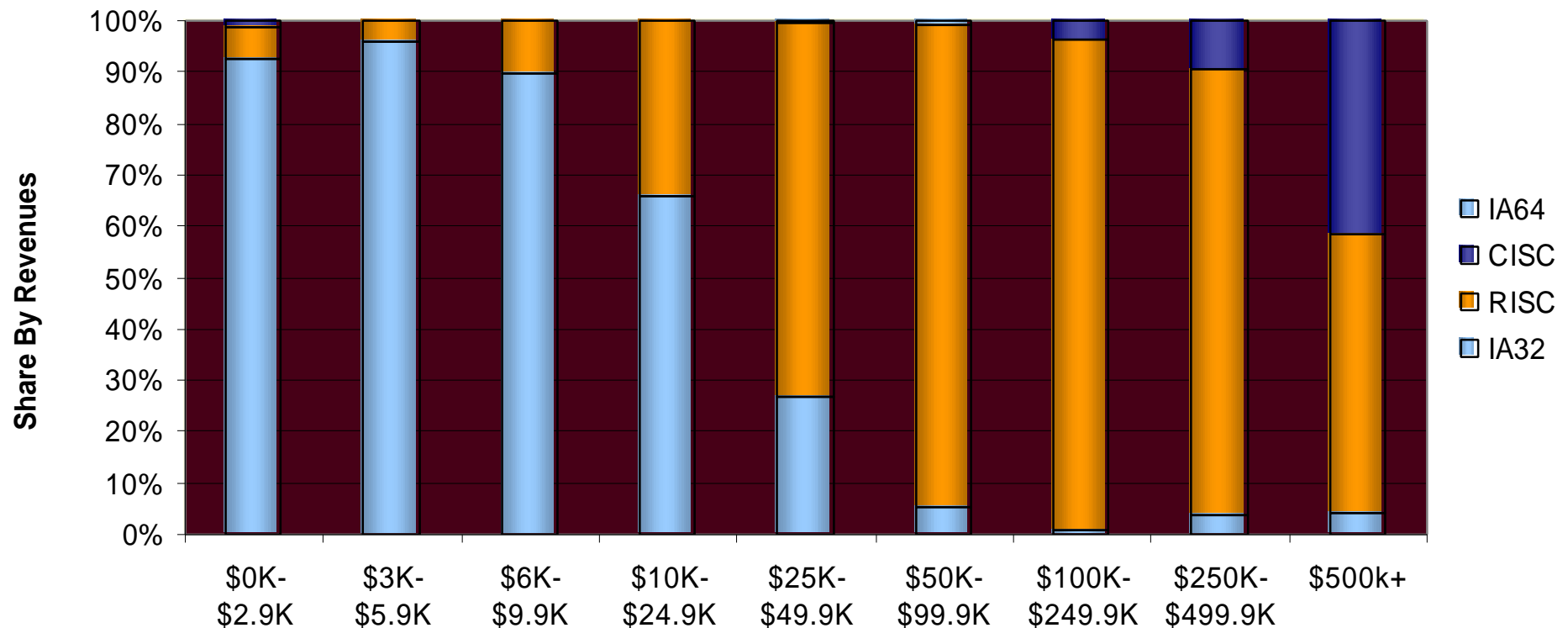
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x86 Dominates Low-End Revenues; 64-Bit Systems Dominate High-End



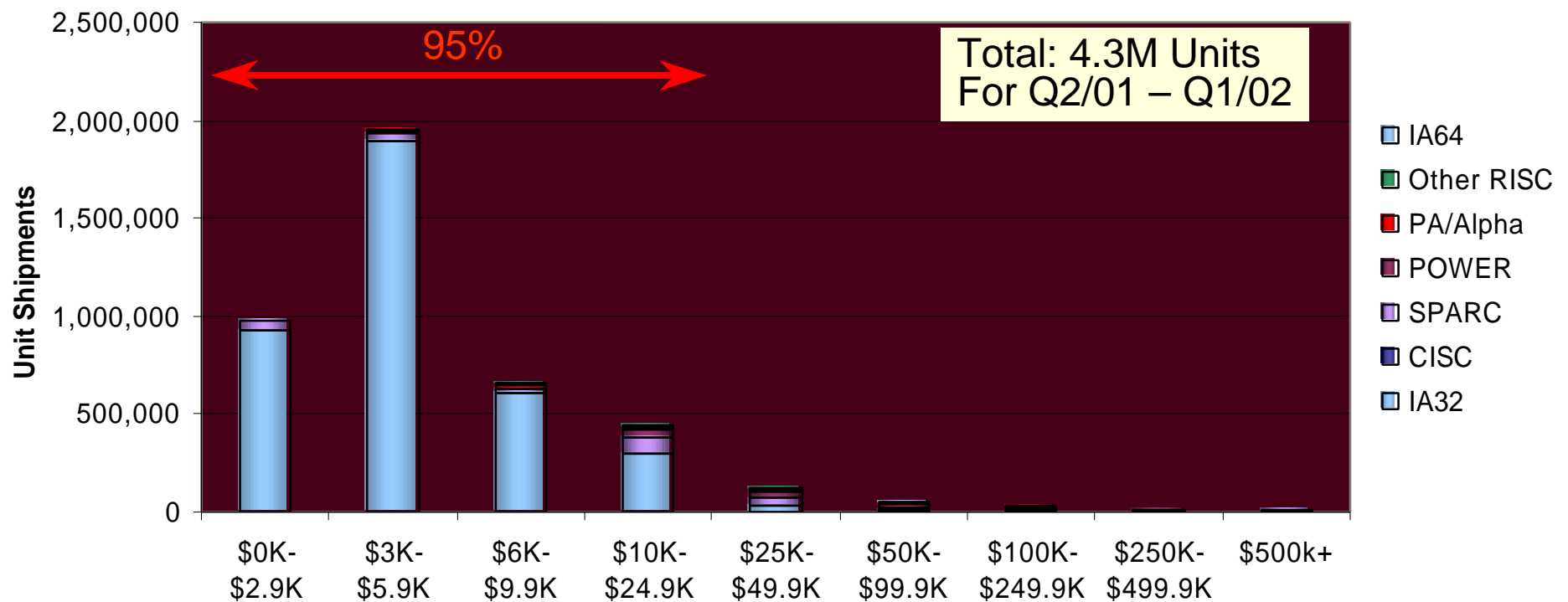
Source: IDC 1Q'02 Server Tracker

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95 Percent of All Server Systems Sell at Prices Below \$25K



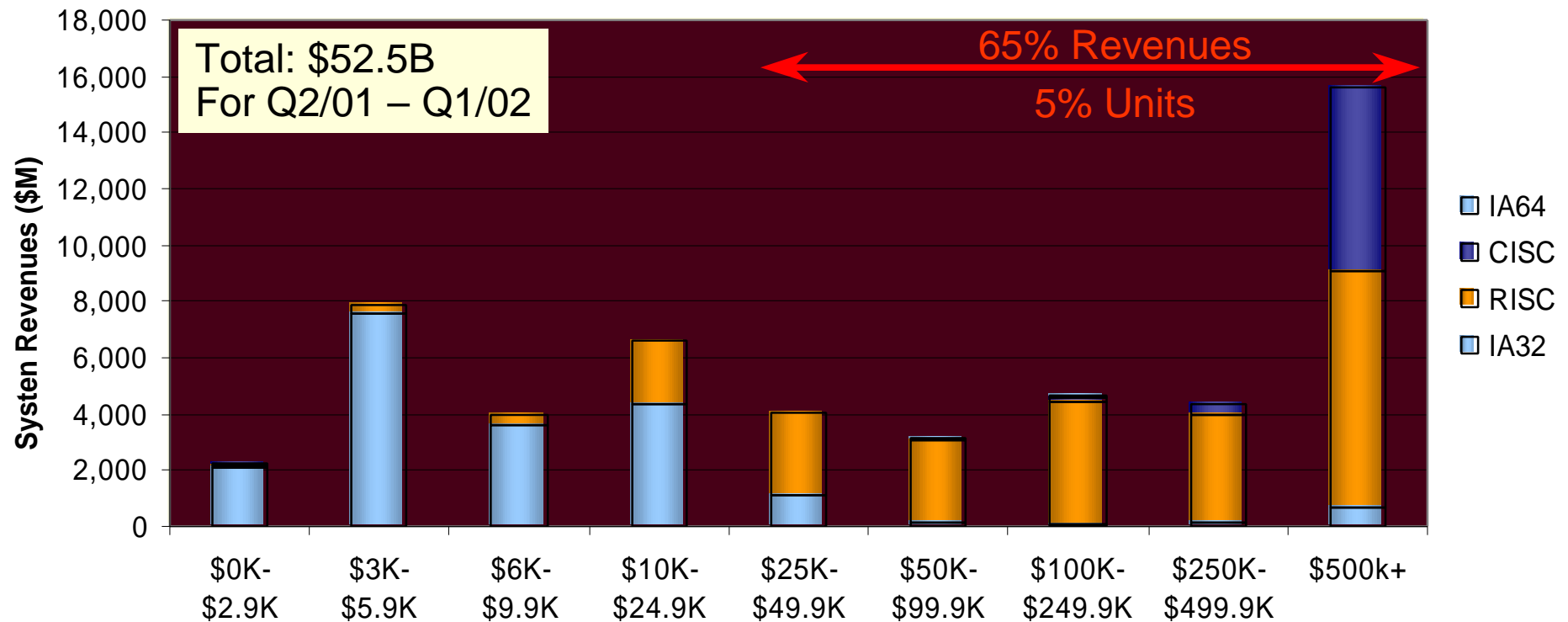
Source: IDC 1Q'02 Server Tracker

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Systems Above \$25K Generate 65 Percent of All Server Revenue



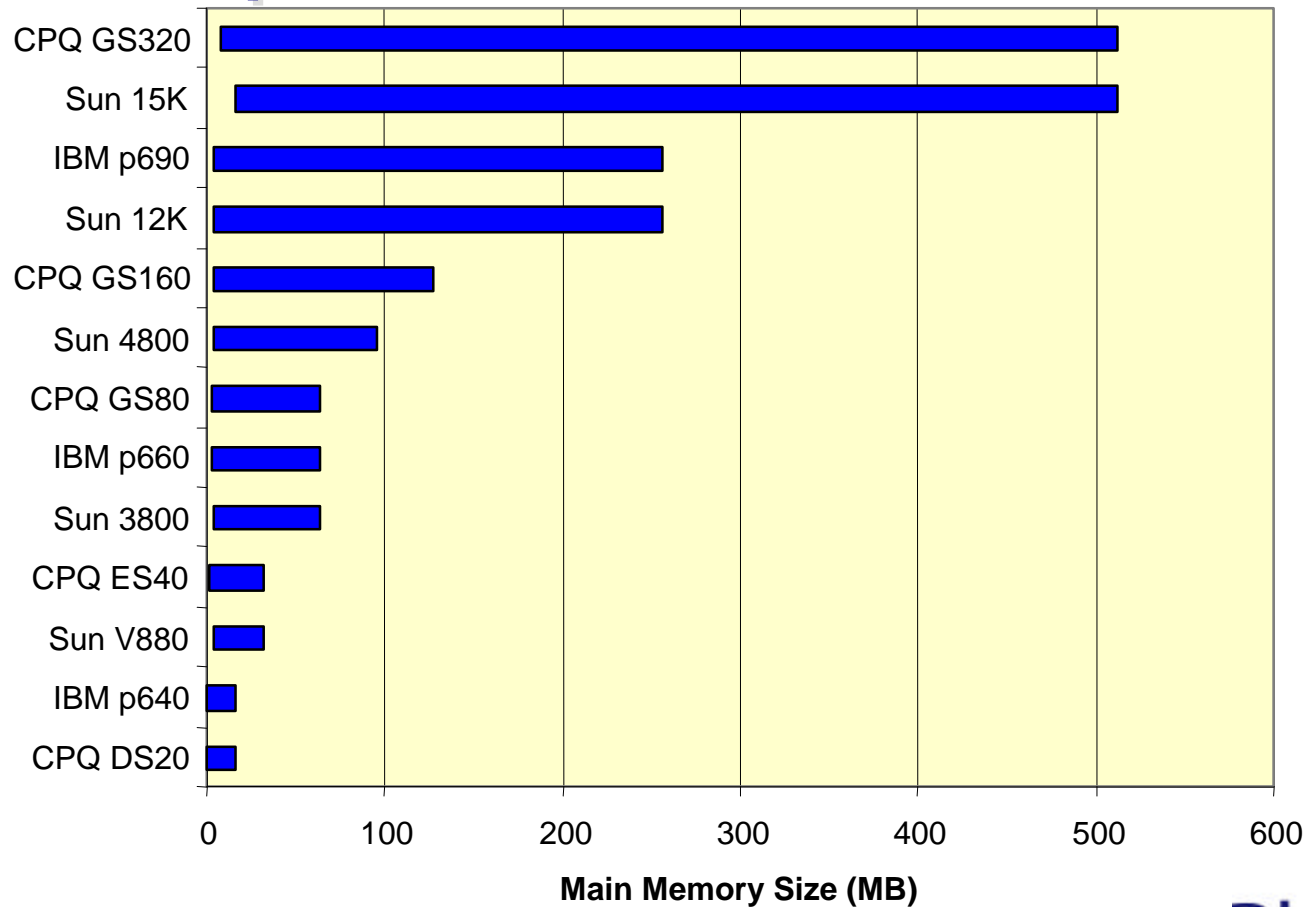
Source: IDC 1Q'02 Server Tracker

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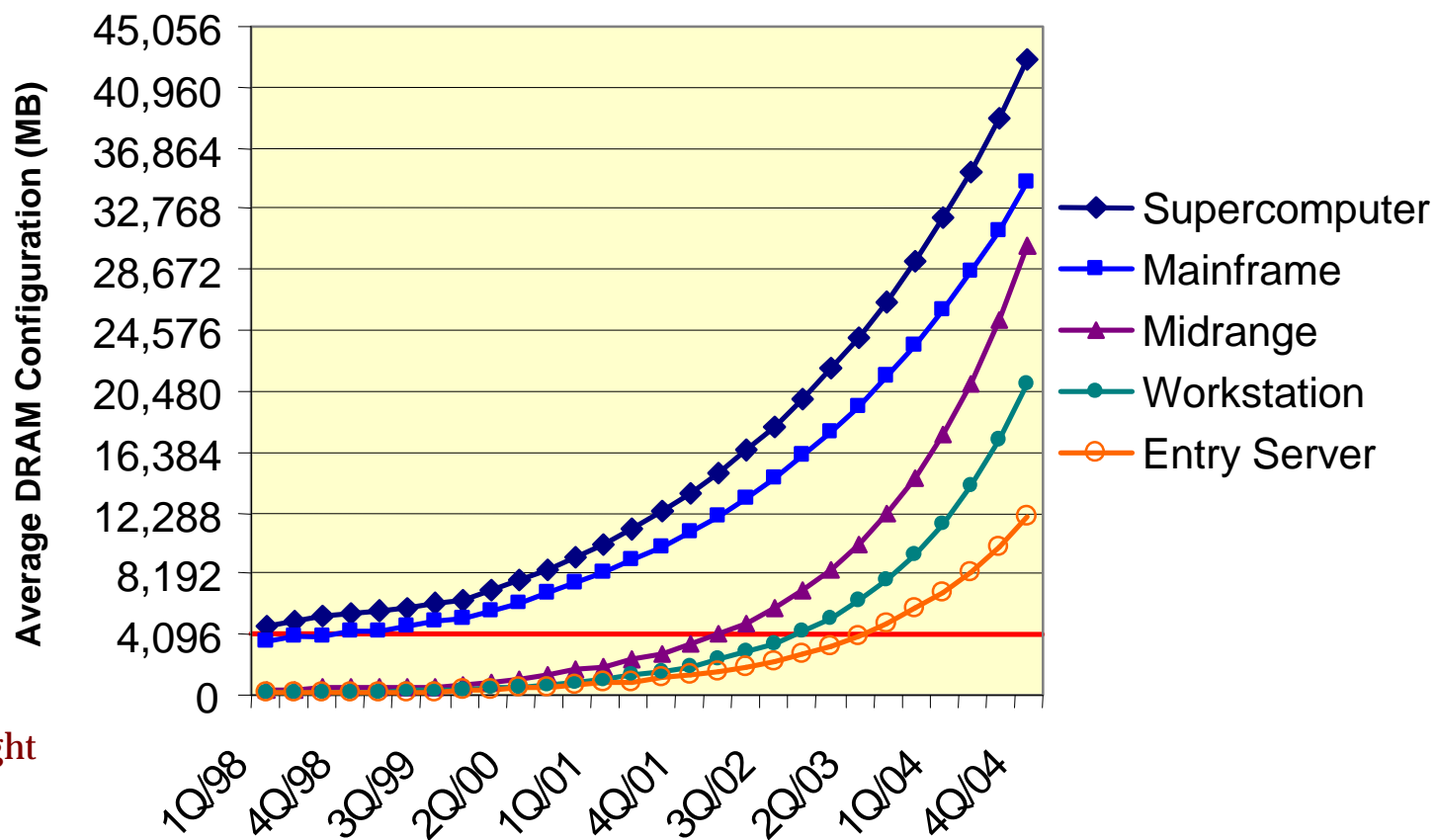
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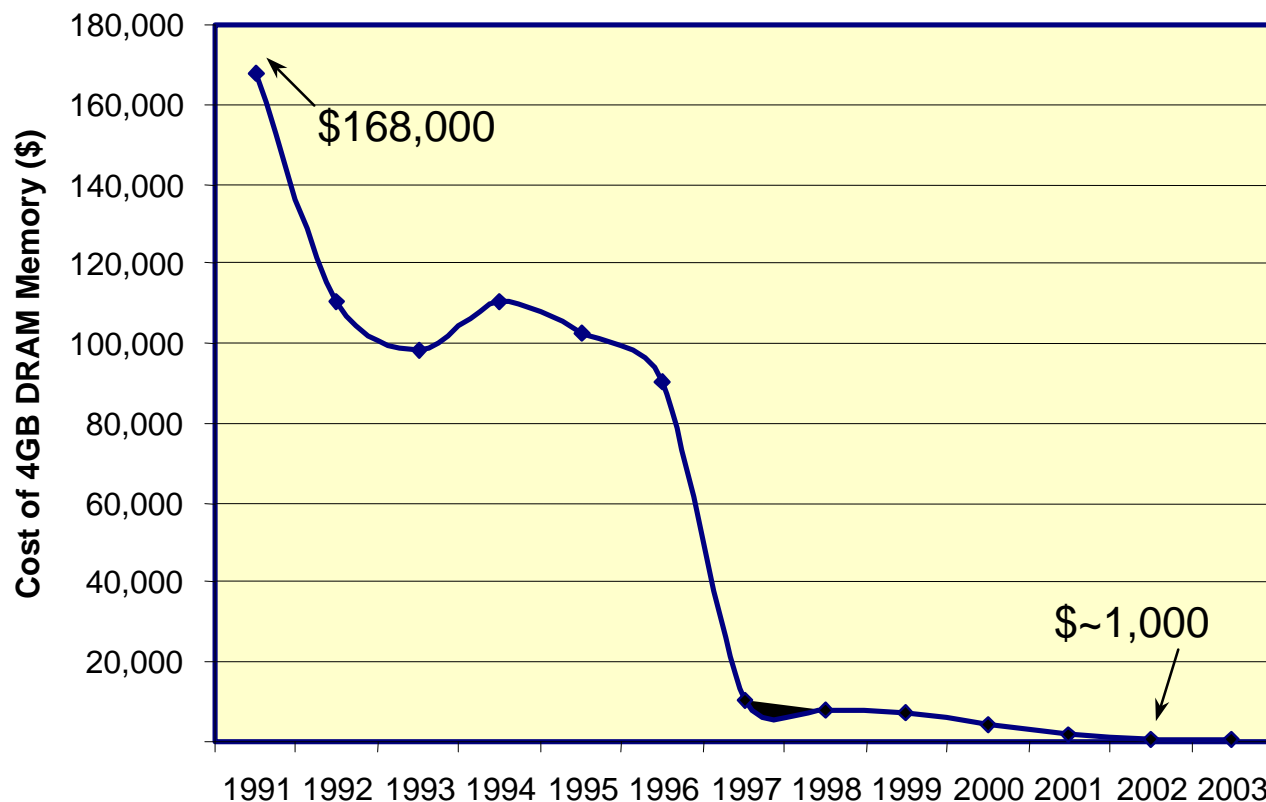
Contemporary Servers Support up to 512 GB DRAM



DRAM Configurations Will Soon Exceed 4 GB in All Server Segments



Eroding DRAM Prices Enable the Trend (Sigh!)



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Source: Dataquest (March, 1999) and Industry Sources

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Warning!

**64-Bit Addressing
Is Only One of Many
Important Server
Microprocessor Attributes**



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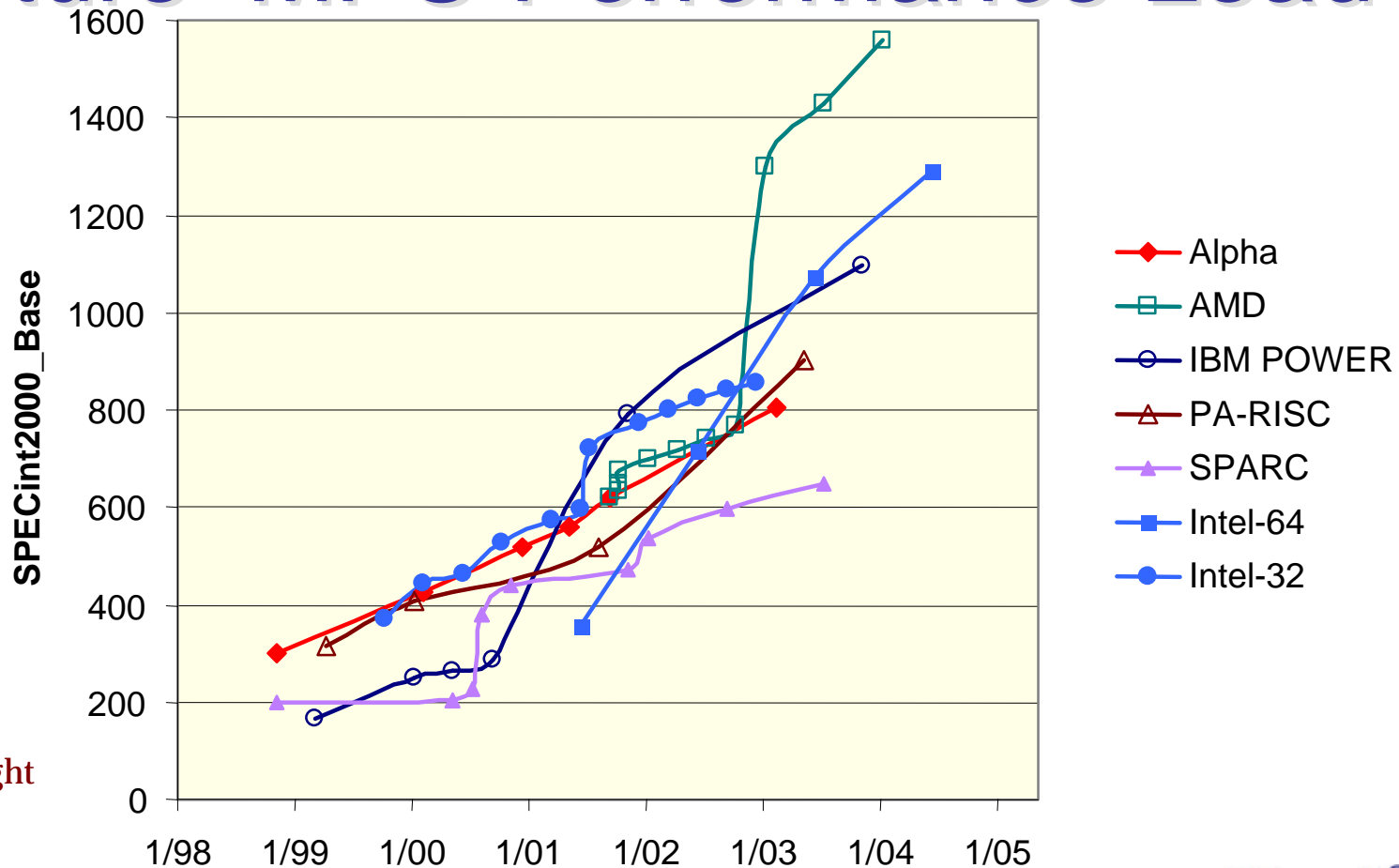


Industry Is Shifting From Vertical to Horizontal Structure

Proprietary Technology	AMD Opteron	Intel Intel Inside ITANIUM ²	DELL	IBM intel	NEC intel	hp invent intel	hp invent	Sun microsystems	IBM
Application Software									
Middle Ware									
Operating System									
System Hardware									
CPU Design									
CPU Fabrication									



Industry-Standard Processors Will Capture MPU Performance Lead



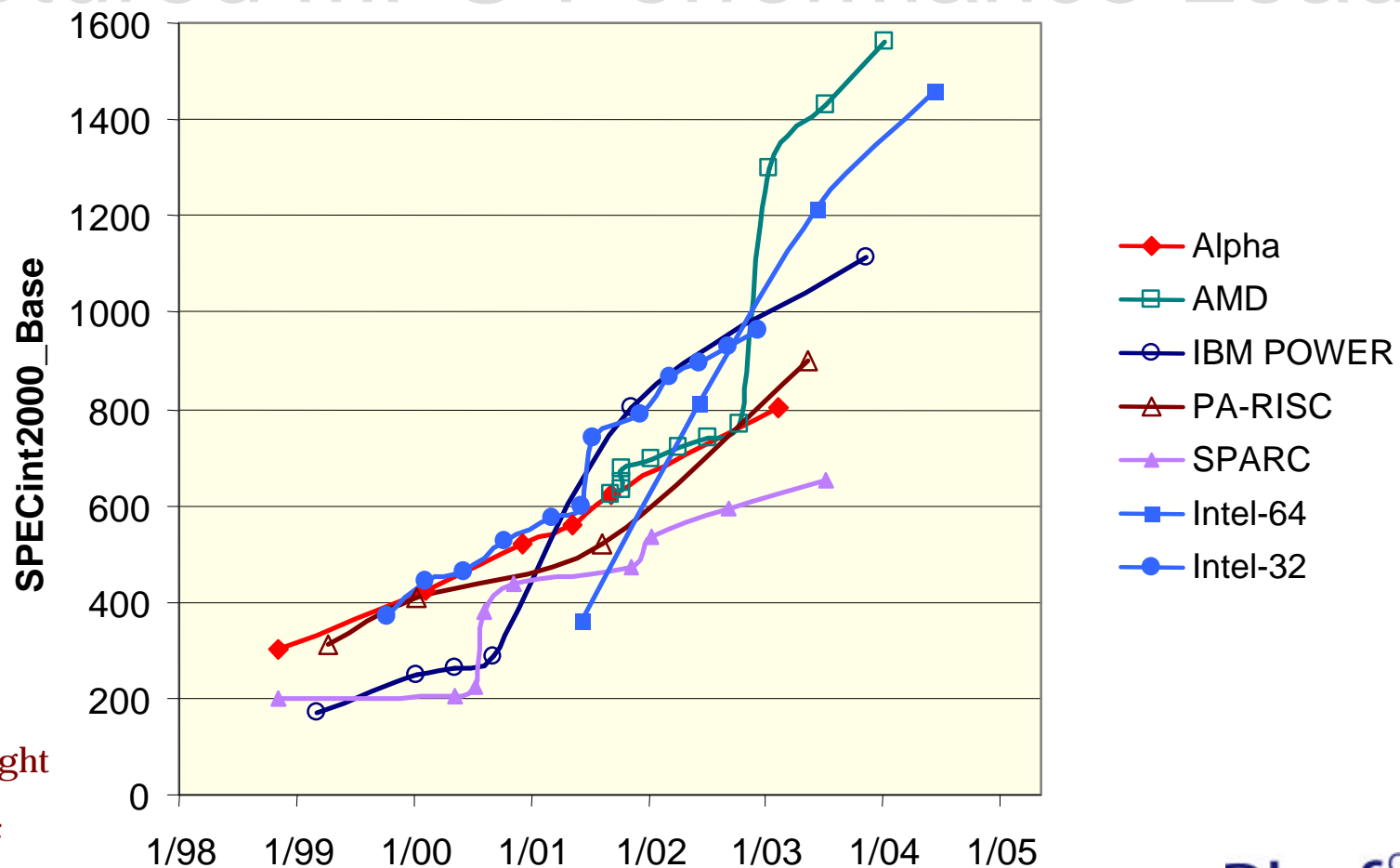
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Source: www.SPEC.org and Insight 64 Estimates (April 2002)

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Industry-Standard Processors ~~Will~~ Have Captured MPU Performance Lead












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Source: www.SPEC.org and Insight 64 Estimates (July 2002)

Two Roads Diverge



 IA-64
 EPIC
 Unlike x86 in
Almost All Regards
 Intel's *Slowest* CPU
for 32-Bit Software
 Requires Traditional
Core Logic Support
Broad Industry Support

X86-64 
CISC 
Like x86 in 
Almost All Regards
AMD's *Fastest* CPU 
for 32-Bit Software
CPU Subsumes Many 
Core Logic Features
Industry Support TBD 



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Summary

- ✍ 64-Bit Capabilities Mandatory for Today's Mid-Range and High-End Systems
- ✍ This Requirement Migrates to Low-End Systems over Next 2-3 Years
- ✍ Emergence of Industry-Standard 64-Bit Processors Marks a Key Change in Market Dynamics



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Panelist Comments

 Jerry Huck	HP
 Wayne Meretsky	AMD
 Leonard Tsai	NEC
 Dave Tuttle	Sun



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Enterprise Computing

Jerry Huck
Chief Architect
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Enterprise Processors

✍ Need 64-bits

✍ Need to solve capacity barriers

✍ Reliability, availability, and scalability have to be “engineered in” from the beginning

✍ 64-way system needs to be at least 64 times more reliable than a uni!

✍ Making fast processors is expensive

✍ Volume industry supplier is key

✍ Getting applications is just as expensive



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Unmatched Application Performance

hp has #1 Itanium® 2-
based system
performance

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- ✍ best 2-way OLTP performance
 - ✍ any architecture or database
- ✍ best 4-way OLTP performance
 - ✍ any architecture or database by at least 1.5x
 - ✍ 1.5x best IA-32
- ✍ beats all IA-32 8p servers in OLTP
 - ✍ by at least >1.2x
- ✍ world's fastest floating-point engine
 - ✍ SPECfp2000
- ✍ fastest SPECweb_SSL performance on Linux
 - ✍ best of any architecture

performance data from www.spec.org as of June 3, 2002

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Major Applications & Tools

available
now

many commercial
applications available
by end of year



ANSYS,
Mental Images: MentalRay,
Side Effects Houdini, RSA,
SQL Server (pilot)
SAP R/3 on SQL (pilot)

MSC NASTRAN, ESI Pam-Flow, ESI Pam-Crash, ANSYS,
LSTC LS Dyna, LS Post,
CD Adapco StarCD, Mental Images:
MentalRay, Gaussian 98, Semichem
AMPAC, PNNL's NWChem, Schrodinger
Jaguar, Chemkin,
U. of Birmingham MOLPRO,
hp Apache, RSA, Zeus, AcuCorp
hp-AppServer 8.0 (Bluestone) (Pilots)



MS Windows Advanced Server LE
PTC Pro/Engineer,
EDS PLM:Unigraphics
SAS 9.0 Core
SAS Analytic CRM

Oracle 9i database
BEA WebLogic Server 7.0
BEA Tuxedo 8.0,
hp-AppServer 8.0,
SAS 9.0 Core,
SAS Analytic CRM
MicroFocus, Acucorp, LegacyJ COBOL
hp WDB 1.4, hp Caliper 2.0
ActiveState Perl
GCC Compiler Collection 3.1
EDS PLM:Unigraphics

MS Windows Enterprise Server
Microsoft SQL server
Oracle 9i database
SAP APO (pilot)
SAS Risk Dimensions
BEA WebLogic Server 7.x

Fluent,
TogetherSoft Control Center 6.0
Wily Technology Introscope
AutoProbe
Sitraka Jprobe
hp Caliper 2.1
Rational ClearCase
RogueWave SourcePro
Parasoft Insure C++, Codewizard
MicroFocus ServerExpress 2.0
Etnus Totalview 5.0

Linux



Mental Images: MentalRay,
Dot C Software: Render Dot C,
Side Effects Houdini, ToonBoom: US
Animation, ANSYS, Gaussian 98, Volare;
ADINAAMBER; NCBI Blast; PNNL's NW
Chem Field View 8, Paralign; NASTRAN,
Apache, Zeus; RSA, Sendmail, SteelEye
Lifekeeper

System Imager
Java Applications: Forte,
TogetherSoft, Jmeter, Jtune
VG Studio Max;
Visual Numerics CNL 4.0 and 5.0
Acucorp COBOL
GCC Compiler Collection 3.1

Oracle 9i database
BEA WebLogic Server 7.x
TurboLinux TurboCockpit,
Accelrys: CASTEP and DMol³
RogueWave SourcePro
Etnus Totalview 5.0

Insight

2002

q2

q3

q4

Itanium[®] 2 processor launch

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All Roads Converge

- ✍ 64-bit
- ✍ All x86 software
- ✍ Volume supplier
- ✍ Enterprise processor
- ✍ Chipset differentiation
- ✍ Multi-OS – Windows, Linux, HP-UX, OpenVMS, NonStop, ...



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✍ Broad Application support

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